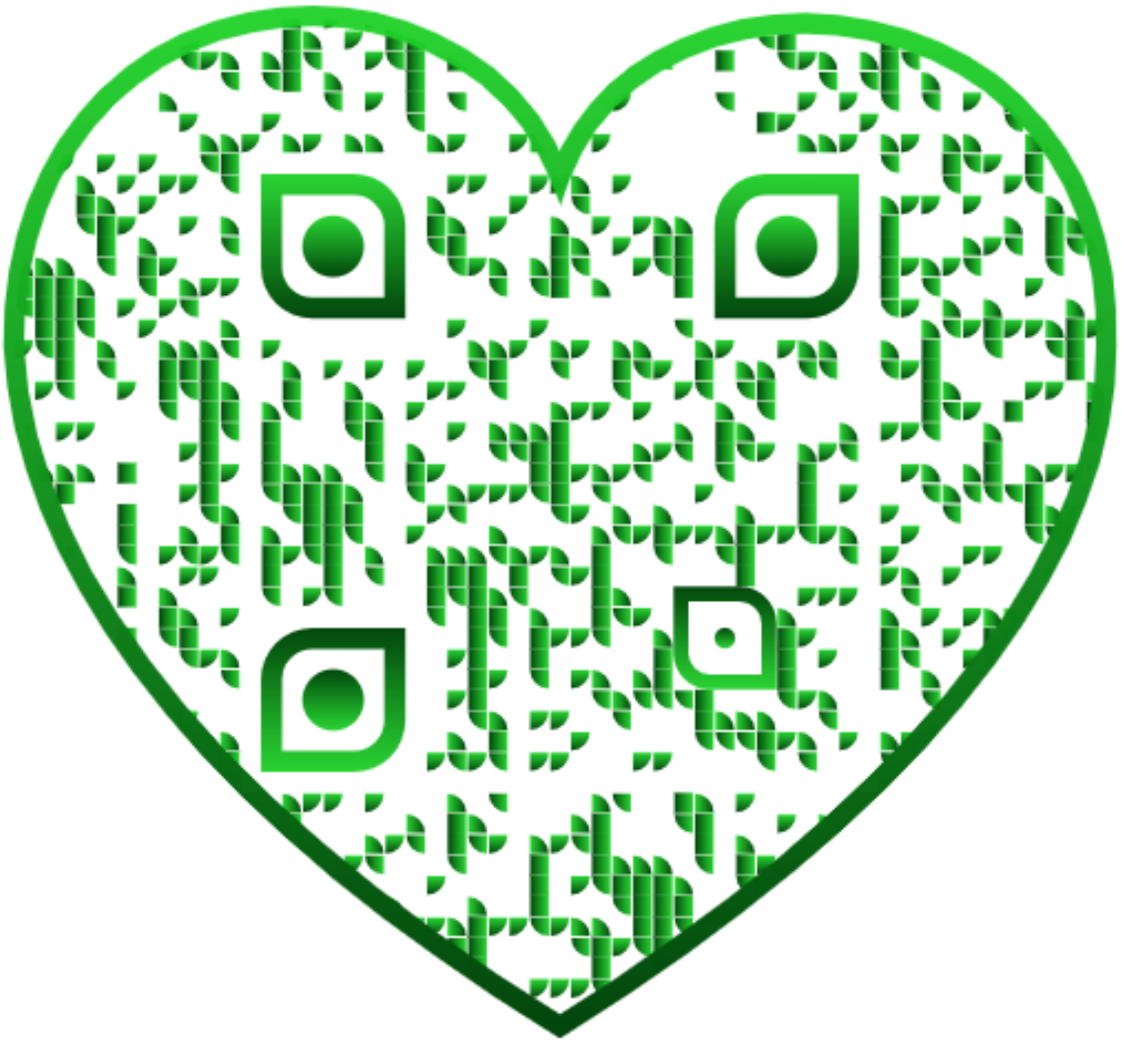
NIOSH List of Hazardous Drugs in Healthcare Settings, 2024

U.S. Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health



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National Institute for Occupational Safety and Health

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December 2024

Foreword

The *National Institute for Occupational Safety and Health (NIOSH) Alert: Preventing Exposures to Antineoplastic and Other Hazardous Drugs in Healthcare Settings* was published in 2004. The purpose of the *Alert* was to increase the awareness among workers in healthcare settings and their employers about the health risks posed by working with hazardous drugs, and to provide them with measures for protecting their health. In Appendix A of the *Alert*, NIOSH identified a sample list of drugs that can be hazardous to healthcare workers with potential occupational exposure to those who handle, prepare, dispense, administer, or dispose of these drugs. NIOSH has periodically updated that list from 2010 through 2016 as the *NIOSH List of Antineoplastic and Other Hazardous Drugs in Healthcare Settings* (*List*).

This document, *NIOSH List of Hazardous Drugs in Healthcare Settings, 2024*, updates the 2016 *List* by adding 25 drugs, 12 with manufacturer's special handling information, and removing 7 drugs. Updates in this document include reducing the number of tables to two and reorganizing how drugs are placed in a table. The *List* no longer uses "antineoplastic" as a table descriptor in the title of Table 1 and does not have a separate table (previously Table 3) for drugs that may be only a developmental and/or reproductive hazard. This document also notes those drugs with approval under a biologics license application (BLA), updates the American Hospital Formulary Services (AHFS) classification and drug nomenclature of various drugs, and removes supplementary information that may have been out of date.

NIOSH has developed a suite of tools to assist with identifying hazardous drugs and handling them appropriately:

- *NIOSH List of Hazardous Drugs in Healthcare Settings, 2024* (this document)
- *Managing Hazardous Drug Exposures: Information for Healthcare Settings*
- *Procedures for Developing the NIOSH List of Hazardous Drugs in Healthcare Settings*

All of these documents are available on the NIOSH Hazardous Drug Exposures in Healthcare website.

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List of Acronyms

AHFS	American Hospital Formulary Service
ASHP	American Society of Health-System Pharmacists (formerly known as American Society of Hospital Pharmacists)
BLA	biologics license application
CDER	Center for Drug Evaluation and Research
CFR	Code of Federal Regulations
DHHS	Department of Health and Human Services
FDA	Food and Drug Administration
HD	human dose
IARC	International Agency for Research on Cancer
MRHD	maximum recommended human dose
MSHI	manufacturer's special handling information
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicology Program
OEL	occupational exposure limit
ONS	Oncology Nursing Society
RHD	recommended human dose
USP	United States Pharmacopeia

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Drugs Considered Hazardous

Introduction

Healthcare workers may be occupationally exposed to drugs and may experience adverse health effects as a result. The *NIOSH Alert: Preventing Occupational Exposures to Antineoplastic and Other Hazardous Drugs in Healthcare Settings (Alert)* was published in September 2004. The *Alert* contained a sample list of drugs identified by NIOSH as hazardous to workers in healthcare settings. NIOSH published updates to the list in *NIOSH List of Antineoplastic Drugs and Other Hazardous Drugs in Healthcare Settings* in 2010, 2012, 2014, 2016, and now this document in 2024.

The *NIOSH List of Hazardous Drugs in Healthcare Settings, 2024 (List),* supersedes previous versions and presents the current list of drugs determined by NIOSH to be hazardous.

The *List* assists employers in providing safe and healthy workplaces by identifying drugs approved by the U.S. Food and Drug Administration (FDA) Center for Drug Evaluation and Research (CDER) that have intrinsic properties that meet the NIOSH definition of a hazardous drug. The *List* creates no legal obligation for employers; it is advisory in nature and informational in content.

CAUTION: Drugs purchased and used by a facility may have entered the marketplace after the list below was assembled. Therefore, this list may not be all-inclusive, and employers should consider creating a facility-specific hazardous drug list.

Defining Hazardous Drugs

NIOSH has formalized the methodology used to guide the addition of drugs to, the removal of drugs from, or the tabular placement of drugs within the *List* in a document entitled *Procedures for Developing the NIOSH List of Hazardous Drugs in Healthcare Settings (Procedures)*.[1]

As stated in the *Procedures*, NIOSH defines a hazardous drug as a drug that is

1. Approved for use in humans[2] by FDA CDER,[3]

[1]NIOSH [2023b]. Procedures for developing the NIOSH list of hazardous drugs in healthcare settings. By Whittaker C, Ovesen JL, MacKenzie BA, Hartley T, Berry KA, Piacentino J. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2023-129, https://www.cdc.gov/niosh/docs/2023-129/.

[2]Although only drugs approved by FDA for use in humans are included in the definition of hazardous drug, some of those drugs may be used in veterinary settings for treatment of animals and may be a hazard for veterinary care workers.

[3]Although biological products, such as vaccines, blood and blood components, allergenics, somatic cells, gene therapy, tissues, recombinant therapeutic proteins, are included in the FDA definition of a drug, they are not included in the drugs that NIOSH evaluates for potential inclusion on the List because they are approved for use by FDA's Center for Biologics Evaluation and Research (CBER), not by FDA's CDER. This provision makes clear NIOSH's long-standing practice of only considering drugs approved by FDA CDER.

2. Not otherwise regulated by the U.S. Nuclear Regulatory Commission,[4] and
3. Either
    a. Is accompanied by prescribing information in the "package insert"[5] that includes manufacturer's special handling information (MSHI)[6] to protect workers handling the drug, or
    b. Is identified as a carcinogenic hazard, developmental hazard, reproductive hazard, genotoxic hazard, or other health hazard by exhibiting one or more of the following toxicity criteria in humans, animal models, or in vitro systems:
        - Carcinogenicity,
        - Developmental toxicity (including teratogenicity),
        - Reproductive toxicity,
        - Genotoxicity,
        - Organ toxicity at low doses,[7] or a
        - Structure and toxicity profile that mimics existing drugs determined hazardous by exhibiting any one of the previous five toxicity types.[8]

However, if a drug also exhibits a molecular property[9] that may limit the potential for adverse health effects from exposure to the drug in healthcare workers, it may be determined it is not a hazard.

[4]10 CFR Parts 19, 20, and 35. *See* https://www.nrc.gov/materials/miau/med-use.html.

[5]"See Drug Advertising: A Glossary of Terms at https://www.fda.gov/drugs/resourcesforyou/consumers/prescriptiondrugadvertising/ucm072025.htm. Prescribing information is also called product information, product labeling, or the package insert ("the PI"). It is generally drafted by the drug company and approved by FDA. This information travels with a drug as it moves from the company to the pharmacist. It includes the details and directions healthcare providers need to prescribe the drug properly. It is also the basis for how the drug company can advertise its drug. The prescribing information includes such details about the drug as: its chemical description; how it works; how it interacts with other drugs, supplements, foods, and beverages; what condition(s) or disease(s) it treats; who should not use the drug; serious side effects, even if they occur rarely; commonly occurring side effects, even if they are not serious; effects on specific groups of patients, such as children, pregnant women, or older adults and how to use it in these populations."

[6]MSHI includes language that informs those handling the drug of the need to follow heightened handling and disposal procedures. For example, language such as "follow special handling and disposal procedures," or "procedures for proper handling and disposal of anticancer drugs should be considered," is frequently used in package inserts. However, NIOSH does not consider language pertaining to packaging and temperature controls as MSHI.

[7]All drugs have toxic side effects, but some exhibit toxicity at low doses. The level of toxicity reflects a continuum from relatively nontoxic to production of toxic effects in patients at low doses (for example, a few milligrams or less). For example, a daily therapeutic dose of 10 milligrams per day (mg/day) or a dose of 1 milligram per kilogram (mg/kg) per day in laboratory animals that produces serious organ toxicity, developmental toxicity, or reproductive toxicity has been used by the pharmaceutical industry to develop occupational exposure limits (OELs) of less than 10 micrograms per cubic meter ($\mu g/m^3$) after applying appropriate uncertainty factors [Naumann and Sargent 1997; Sargent and Kirk 1988; Sargent et al. 2002]. OELs in this range are typically established for potent or toxic drugs in the pharmaceutical industry. Under all circumstances, an evaluation of all available data should be conducted to protect healthcare workers.

[8]NIOSH [2004]. NIOSH Alert: preventing occupational exposures to antineoplastic and other hazardous drugs in health care settings. By Burroughs GE, Connor TH, McDiarmid MA, Mead KR, Power LA, Reed LD, Coyle BJ, Hammond DR, Leone MM, Polovich M, Sharpnack DD. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2004-165, https://www.cdc.gov/niosh/docs/2004-165/pdfs/2004-165.pdf.

[9]Properties of a drug molecule that may limit adverse effects in healthcare workers are typically chemical, physical, and structural properties that affect its absorption, distribution within the body, metabolism, or excretion, e.g., chemical structure, molecular weight, or mass. See Clementi F, Fumagalli G [2015]. Molecular pharmacology. Hoboken, NJ: Wiley & Sons; Di L, Kerns EH [2016]. Drug-like properties: concepts, structure, design and methods. Oxford, UK: Elsevier; Mattson P, Kihlberg J [2017]. How big is too big for cell permeability? J Med Chem *60*(5):1662–1664, https://doi.org/10.1021/acs.jmedchem.7b00237.

Determining Whether a Drug Is Hazardous

NIOSH uses a sequential approach for assessing and interpreting scientific information to determine whether an FDA CDER-approved drug meets the NIOSH definition of a hazardous drug. NIOSH's approach to evaluating the hazard potential of a drug includes (1) reviewing FDA databases to identify drugs that have the potential to meet the NIOSH definition of a hazardous drug; (2) reviewing molecular properties and information in the manufacturer-provided drug package insert to identify information relevant to making a determination about placing a drug on the *List*, excluding a drug from the *List*, or removing a drug from the *List*; (3) assessing, integrating, and synthesizing evidence from human, animal, and in vitro studies of drug toxicity; (4) using molecular property, toxicity and hazard characterization criteria established in the *Procedures* in making a decision to place a drug on the *List* or to exclude a drug from the *List*; and (5) allowing for reevaluation of a NIOSH decision to place, or not to place, a drug on the *List*, or to place a drug on a particular table of the *List*.

The methodology used by NIOSH to evaluate chemical properties, preclinical information, and clinical information about each drug is detailed in the *Procedures*.

Developing a Facility-specific List of Hazardous Drugs

The *List* is an aid designed to enable employers to identify which drugs handled by employees are considered by NIOSH to be hazardous drugs. Because new drugs and new formulations are continuously brought to market between NIOSH's periodic updates, hazardous drug evaluation should be a continual process. Employers should establish their own procedures to identify and evaluate new drugs as they enter their workplace and, when appropriate, reassess their presence on hazardous drug lists as toxicological data become available to support re-categorization.

In developing a facility-specific list of hazardous drugs, workplaces may consider facility-specific criteria, including the specific product formulations and packaging within their facility, which NIOSH cannot utilize when developing the *List*. In addition to the *List*, nongovernmental organizations have developed various approaches to identifying and classifying hazardous drugs [Badry et al. 2014; Chaffee et al. 2010; Kaestli et al. 2013]. When creating a facility-specific list, some facilities may find they handle investigational drugs that have not been approved by FDA CDER or reviewed by NIOSH. Toxicological data may be incomplete or unavailable for investigational drugs. If the mechanism of action suggests that there may be a concern, it is prudent to handle them as hazardous drugs until adequate information becomes available to exclude them.

A site-specific risk assessment is outside the scope of the *List* and includes consideration of dose, potency, and exposure potential during formulation and use from events such as routine handling, compounding, spills, broken device, needle stick, inadvertent contact, or surface contamination. When using a drug on the *List*, NIOSH encourages employers to do a site-specific risk assessment that informs effective risk management procedures. More information about managing the risk of handling hazardous drugs can be found in Managing Hazardous Drug Exposures: Information for Healthcare Settings (Managing Exposures)

[NIOSH 2023a]. A facility-specific list, along with *Managing Exposures* and other guidance from the American Society of Health-System Pharmacists (ASHP), United States Pharmacopeia (USP), Oncology Nursing Society (ONS), and other organizations, can help employers establish effective hazardous drug management procedures specific to their workplace.

References

Badry N, Fabbro J, de Lemos ML [2014]. Hazards in determining whether a drug is hazardous. J Oncol Pharm Pract *20*(4):312–315, https://doi.org/10.1177/1078155213496675.

Chaffee BW, Armistead JA, Benjamin BE, Cotugno MC, Forrey RA, Hintzen BL, Pfeiffenberger T, Stevenson JG [2010]. Guidelines for the safe handling of hazardous drugs: consensus recommendations. Am J Health Syst Pharm *67*(18):1545–1546, https://doi.org/10.2146/ajhp100138.

Kaestli L-Z, Fonzo-Christe C, Bonfillon C, Desmueles J, Bonnabry P [2013]. Development of a standardised method to recommend protective measures to handle hazardous drugs in hospitals. Eur J Hosp Pharm *20*(2):100–105, https://doi.org/10.1136/ejhpharm-2012-000222.

Naumann BD, Sargent EV [1997]. Setting occupational exposure limits for pharmaceuticals. Occup Med *12*(1):67–80, PMID: 9153053.

NIOSH [2004]. NIOSH Alert: preventing occupational exposure to antineoplastic and other hazardous drugs in health care settings. By Burroughs GE, Connor TH, McDiarmid MA, Mead KR, Power LA, Reed LD, Coyle BJ, Hammond DR, Leone MM, Polovich M, Sharpnack DD. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2004-165, https://www.cdc.gov/niosh/docs/2004-165/pdfs/2004-165.pdf.

NIOSH [2023a]. Managing hazardous drug exposures: information for healthcare settings. By Hodson L, Ovesen J, Couch J, Hirst D, Lawson C, Lentz TJ, MacKenzie B, Mead K. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2023-130, https://doi.org/10.26616/NIOSHPUB2023130.

NIOSH [2023b]. Procedures for developing the NIOSH list of hazardous drugs in healthcare settings. By Whittaker C, Ovesen JL, MacKenzie BA, Hartley T, Berry KA, Piacentino J. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2023-129, https://doi.org/10.26616/NIOSHPUB2023129.

Sargent EV, Kirk GD [1988]. Establishing airborne exposure control limits in the pharmaceutical industry. Am Ind Hyg Assoc J *49*(6):309–313, https://doi.org/10.1080/15298668891379792.

Sargent EV, Naumann BD, Dolan DG, Faria EC, Schulman L [2002]. The importance of human data in the establishment of occupational exposure limits. Hum Ecol Risk Assess *8*(4):805–822, https://doi.org/10.1080/20028091057213.

NIOSH List of Hazardous Drugs in Healthcare Settings, 2024

NIOSH performed a hazard identification and characterization of each drug on the *List,* in accordance with the NIOSH *Procedures for Developing the NIOSH List of Hazardous Drugs in Healthcare Settings*.

The 2024 *List* supersedes previous versions.

2024 Hazardous Drugs List Changes

The 2024 *List* adds 25 drugs, 12 of which have special handling[10] information from the manufacturers, and removes 7 drugs[11] from the list. Drugs reviewed for this update were new drug approvals or received new safety-related warnings from FDA during the period from January 2014 through December 2015. In addition to these updates, the tables categorizing hazardous drugs have been reorganized and are discussed below.

Table 1 now includes drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of these criteria:

- Are classified by the National Toxicology Program (NTP) as "known to be a human carcinogen"
- Are classified by the International Agency for Research on Cancer (IARC) as Group 1 "carcinogenic to humans" or Group 2A "probably carcinogenic to humans"

In the 2016 *List*, this table identified antineoplastic drugs; however, in this update, not all of the drugs in Table 1 are antineoplastic drugs.

Table 2 now contains drugs that meet one or more of the criteria in the NIOSH definition of a hazardous drug and

- Do not have MSHI
- Are not classified by the NTP as "known to be a human carcinogen"
- Are not classified by the IARC as Group 1 "carcinogenic to humans" or Group 2A "probably carcinogenic to humans"

Some drugs in Table 2 may also have adverse developmental and/or reproductive effects.

Table 2 now also includes drugs that only meet the NIOSH criteria as a developmental (including teratogenicity) and/or reproductive hazard. In the 2016 update of the *List*, this table did not include drugs that only posed a developmental and/or reproductive hazard.

[10]When NIOSH becomes aware of recently approved drugs that include MSHI, it adds them to the *List* at that time. The notifications of these additions are posted to the NIOSH website at https://www.cdc.gov/niosh/docs/2016-161/default.html. These drugs would have been officially on the previous version of the *List* from the date of the notification and are only now being added into the publication.

[11]When NIOSH removes a drug from the *List*, the notifications of these removals are posted to the NIOSH website at https://www.cdc.gov/niosh/docs/2016-161/default.html.

In the 2016 *List*, Table 3 provided a list of drugs that met the NIOSH criteria of a reproductive hazard (damaging to a male or female person's ability to conceive or carry to term an offspring) or developmental hazard (able to cause disruption in the development of unborn children including teratogenic outcomes). In this 2024 *List*, those drugs that only meet NIOSH's criteria as a developmental and/or reproductive hazard are identified in the column "Only Developmental and/or Reproductive Hazard" in Table 2 with a blue notification; a separate table is no longer provided.

In the 2016 *List*, Table 4 provided a list of the drugs removed from the *List*. In this 2024 *List*, a new section identifies changes to the placement of drugs on the *List*, including drugs that are no longer considered hazardous and those that have been moved from one table to another.

In the 2016 *List*, Table 5 provided information on recommended exposure controls for hazardous drugs based on formulations. NIOSH has removed the table from the 2024 *List*. Risk management is outside the scope of the *List* document. NIOSH addresses risk management issues in *Managing Exposures*, which includes information on using engineering controls, administrative controls, and personal protective equipment when working with hazardous drugs in healthcare settings. It is available on the *NIOSH Hazardous Drug Exposures in Healthcare* website.

In previous *Lists*, the supplemental information column contained information, including pregnancy categories, that may not have been related to the NIOSH decision to place the drug on the *List*. NIOSH has removed the supplemental information column.

In the 2024 *List*, NIOSH has included a column to identify drugs that were approved by CDER under a biologics license application (BLA). This may provide useful information regarding some properties of these drugs, as drugs that receive BLA approval are often treatments derived from proteins or other large biological molecules.

CAUTION: Drugs purchased and used by a facility may have entered the marketplace after the list below was assembled. This list is not all inclusive. Drugs reviewed for this update were new drug approvals or received safety-related new warnings from FDA during the period from January 2014 through December 2015.

More recent information on drugs, including updated product inserts and information on new safety-related changes to labels, can be found at

FDA Approved Drugs:
accessdata.fda.gov/scripts/cder/daf/index.cfm

FDA Safety-related Labeling Changes:
accessdata.fda.gov/scripts/cder/safetylabelingchanges/

DailyMed:
dailymed.nlm.nih.gov/dailymed/

DrugBank:
go.drugbank.com/

NIOSH List of Hazardous Drugs in Healthcare Settings 2024, Table 1

Table 1 contains drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of these criteria:

- Are classified by the National Toxicology Program (NTP) as "known to be a human carcinogen"
- Are classified by the International Agency for Research on Cancer (IARC) as Group 1 "carcinogenic to humans" or Group 2A "probably carcinogenic to humans"

Many of these drugs are cytotoxic, and many are hazardous to those workers who are actively trying to conceive, who are pregnant or may become pregnant, and who are breastfeeding because the drugs may be excreted in breast milk.

Not all drugs in Table 1 are antineoplastic drugs.

Drugs reviewed for this update were new drug approvals or received new safety-related warnings from FDA in the period from January 2014 through December 2015.

Drugs underlined and in red font were added on the 2024 *List* update.

Table abbreviations and footnotes. **AHFS** = American Hospital Formulary Service; **MSHI** = manufacturer's special handling information; **NA** = not available.

*Drugs identified as IARC Group 2B "possibly carcinogenic to humans" or as NTP "reasonably anticipated to be a human carcinogen" are listed in Table 1 because they have MSHI.

Table 1. Drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of the following criteria: are classified by the NTP as "known to be a human carcinogen", or are classified by IARC as Group 1, "carcinogenic to humans" or Group 2A, "probably carcinogenic to humans."

Drug	AHFS Classification	MSHI	Biologics License Application	IARC and NTP Classification
ado-trastuzumab emtansine	10:00 antineoplastic agents	Yes	Yes	
altretamine	10:00 antineoplastic agents	Yes	No	
amsacrine	10:00 antineoplastic agents	Yes	No	IARC Group 2B*
arsenic trioxide	10:00 antineoplastic agents	Yes	No	IARC Group 1 carcinogen; NTP "known to be a human carcinogen"
azacitidine	10:00 antineoplastic agents	Yes	No	IARC Group 2A carcinogen; NTP "reasonably anticipated to be a human carcinogen"
azathioprine	92:44 immunosuppressive agents; 92:20 immunomodulatory agents; 92:36 disease-modifying antirheumatic drugs	Yes	No	IARC Group 1 carcinogen; NTP "known to be human carcinogen"
belantamab mafodotin	10:00 antineoplastic agents	Yes	Yes	
belinostat	10:00 antineoplastic agents	Yes	No	
bendamustine	10:00 antineoplastic agents	Yes	No	
bleomycin	10:00 antineoplastic agents	Yes	No	IARC Group 2B*
bortezomib	10:00 antineoplastic agents	Yes	No	
brentuximab vedotin	10:00 antineoplastic agents	Yes	Yes	
busulfan	10:00 antineoplastic agents	Yes	No	IARC Group 1 carcinogen
cabazitaxel	10:00 antineoplastic agents	Yes	No	
capecitabine	10:00 antineoplastic agents	Yes	No	
carboplatin	10:00 antineoplastic agents	Yes	No	
carmustine	10:00 antineoplastic agents	Yes	No	IARC Group 2A carcinogen

(Continued)

Table 1 (Continued). Drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of the following criteria: are classified by the NTP as "known to be a human carcinogen", or are classified by IARC as Group 1, "carcinogenic to humans" or Group 2A, "probably carcinogenic to humans."

Drug	AHFS Classification	MSHI	Biologics License Application	IARC and NTP Classification
chlorambucil	10:00 antineoplastic agents	Yes	No	IARC Group 1 carcinogen; NTP "known to be human carcinogen"
chloramphenicol	8:12.08 chloramphenicol	No	No	IARC Group 2A carcinogen; NTP "reasonably anticipated to be a human carcinogen"
cidofovir	8:18.32 nucleosides and nucleotides	Yes	No	
cisplatin	10:00 antineoplastic agents	Yes	No	IARC Group 2A carcinogen; NTP "reasonably anticipated to be a human carcinogen"
cladribine	10:00 antineoplastic agents	Yes	No	
clofarabine	10:00 antineoplastic agents	Yes	No	
cyclophosphamide	10:00 antineoplastic agents; 92:44 immunosuppressive agents	Yes	No	IARC Group 1 carcinogen; NTP "known to be human carcinogen"
cyclosporine	52:08.92 anti-inflammatory agents; 92:44 immunosuppressive agents; 92:20 immunomodulatory agents; 92:36 disease-modifying antirheumatic drugs	No	No	IARC Group 1 carcinogen; NTP "known to be human carcinogen"
cytarabine	10:00 antineoplastic agents	Yes	No	
dacarbazine	10:00 antineoplastic agents	Yes	No	IARC Group 2B; NTP "reasonably anticipated to be a human carcinogen" *
dactinomycin	10:00 antineoplastic agents	Yes	No	
dasatinib	10:00 antineoplastic agents	Yes	No	
daunorubicin	10:00 antineoplastic agents	Yes	No	IARC Group 2B*
decitabine	10:00 antineoplastic agents	Yes	No	

(Continued)

Table 1 (Continued). Drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of the following criteria: are classified by the NTP as "known to be a human carcinogen", or are classified by IARC as Group 1, "carcinogenic to humans" or Group 2A, "probably carcinogenic to humans."

Drug	AHFS Classification	MSHI	Biologics License Application	IARC and NTP Classification
dexrazoxane	92:56 protective agents	Yes	No	
diethylstilbestrol	NA	No	No	IARC Group 1 carcinogen; NTP "known to be a human carcinogen"
docetaxel	10:00 antineoplastic agents	Yes	No	
doxorubicin	10:00 antineoplastic agents	Yes	No	IARC Group 2A carcinogen; NTP "reasonably anticipated to be a human carcinogen"*
enfortumab vedotin	10:00 antineoplastic agents	Yes	Yes	
epirubicin	10:00 antineoplastic agents	Yes	No	
eribulin mesylate	10:00 antineoplastic agents	Yes	No	
estramustine	10:00 antineoplastic agents	Yes	No	
estrogen/ progesterone combinations	68:12 contraceptives; 68:16.04 estrogens; 68:32 progestins	No	No	IARC Group 1 carcinogen; NTP "known to be a human carcinogen"
estrogens, conjugated	68:16.04 estrogens; 92:24 bone resorption inhibitors	No	No	NTP "known to be a human carcinogen"
estrogens, esterified	68:16.04 estrogens; 92:24 bone resorption Inhibitors	No	No	NTP "known to be a human carcinogen"
etoposide	10:00 antineoplastic agents	Yes	No	IARC Group 1 carcinogen
everolimus	10:00 antineoplastic agents; 92:44 immunosuppressive agents	Yes	No	
fam-trastuzumab deruxtecan	10:00 antineoplastic agents	Yes	Yes	
floxuridine	10:00 antineoplastic agents	Yes	No	
fludarabine	10:00 antineoplastic agents	Yes	No	

(Continued)

Table 1 (Continued). Drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of the following criteria: are classified by the NTP as "known to be a human carcinogen", or are classified by IARC as Group 1, "carcinogenic to humans" or Group 2A, "probably carcinogenic to humans."

Drug	AHFS Classification	MSHI	Biologics License Application	IARC and NTP Classification
fluorouracil	10:00 antineoplastic agents; 84:92 skin and mucous membrane agents, miscellaneous	Yes	No	
ganciclovir	8:18.32 nucleosides and nucleotides; 52:04.20 antivirals	Yes	No	
gemcitabine	10:00 antineoplastic agents	Yes	No	
gemtuzumab ozogamicin	10:00 antineoplastic agents	Yes	Yes	
hydroxyurea	10:00 antineoplastic agents	Yes	No	
idarubicin	10:00 antineoplastic agents	Yes	No	
ifosfamide	10:00 antineoplastic agents	Yes	No	
imatinib	10:00 antineoplastic agents	Yes	No	
inotuzumab ozogamicin	10:00 antineoplastic agents	Yes	Yes	
irinotecan	10:00 antineoplastic agents	Yes	No	
ixabepilone	10:00 antineoplastic agents	Yes	No	
ixazomib	10:00 antineoplastic agents	Yes	No	
lenalidomide	10:00 antineoplastic agents; 92:20 immunomodulatory agents	Yes	No	
loncastuximab tesirine	10:00 antineoplastic agents	Yes	Yes	
lomustine	10:00 antineoplastic agents	Yes	No	IARC Group 2A carcinogen
lurbinectedin	10:00 antineoplastic agents	Yes	No	

(Continued)

Table 1 (Continued). Drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of the following criteria: are classified by the NTP as "known to be a human carcinogen", or are classified by IARC as Group 1, "carcinogenic to humans" or Group 2A, "probably carcinogenic to humans."

Drug	AHFS Classification	MSHI	Biologics License Application	IARC and NTP Classification
mechlorethamine	10:00 antineoplastic agents; 84:92 skin and mucous membrane agents, miscellaneous	Yes	No	
melphalan	10:00 antineoplastic agents	Yes	No	IARC Group 1 carcinogen; NTP "known to be a human carcinogen"
melphalan flufenamide	10:00 antineoplastic agents	Yes	No	
mercaptopurine	10:00 antineoplastic agents; 92:44 immunosuppressive agents	Yes	No	
methotrexate	10:00 antineoplastic agents; 92:20 immunomodulatory agents; 92:36 disease-modifying antirheumatic drugs; 92:44 immunosuppressive agents	Yes	No	
mirvetuximab soravtansine	10:00 antineoplastic agents	Yes	Yes	
mitomycin	10:00 antineoplastic agents	Yes	No	IARC Group 2B*
mitotane	10:00 antineoplastic agents	Yes	No	
mitoxantrone	10:00 antineoplastic agents	Yes	No	IARC Group 2B*
mycophenolate mofetil	92:44 immunosuppressive agents	Yes	No	
nelarabine	10:00 antineoplastic agents	Yes	No	
omacetaxine	10:00 antineoplastic agents	Yes	No	
oxaliplatin	10:00 antineoplastic agents	Yes	No	
paclitaxel	10:00 antineoplastic agents	Yes	No	
panobinostat	10:00 antineoplastic agents	Yes	No	

(Continued)

Table 1 (Continued). Drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of the following criteria: are classified by the NTP as "known to be a human carcinogen", or are classified by IARC as Group 1, "carcinogenic to humans" or Group 2A, "probably carcinogenic to humans."

Drug	AHFS Classification	MSHI	Biologics License Application	IARC and NTP Classification
pemetrexed	10:00 antineoplastic agents	Yes	No	
pentostatin	10:00 antineoplastic agents	Yes	No	
polatuzumab vedotin	10:00 antineoplastic agents	Yes	Yes	
pomalidomide	10:00 antineoplastic agents; 92:20 immunomodulatory agents	Yes	No	
pralatrexate	10:00 antineoplastic agents	Yes	No	
procarbazine	10:00 antineoplastic agents	Yes	No	IARC Group 2A carcinogen
romidepsin	10:00 antineoplastic agents	Yes	No	
sacituzumab govitecan	10:00 antineoplastic agents	Yes	Yes	
streptozocin	10:00 antineoplastic agents	Yes	No	IARC Group 2B; NTP "reasonably anticipated to be a human carcinogen" *
tamoxifen	10:00 antineoplastic agents; 68:16.12 estrogen agonists-antagonists	No	No	IARC Group 1 carcinogen; NTP "known to be a human carcinogen"
temozolomide	10:00 antineoplastic agents	Yes	No	
temsirolimus	10:00 antineoplastic agents	Yes	No	
teniposide	10:00 antineoplastic agents	Yes	No	IARC Group 2A carcinogen
thalidomide	92:20 immunomodulatory agents	Yes	No	
thioguanine	10:00 antineoplastic agents	Yes	No	
thiotepa	10:00 antineoplastic agents	Yes	No	IARC Group 1 carcinogen; NTP "known to be a human carcinogen"
tisotumab-vedotin	10:00 antineoplastic agents	Yes	Yes	
topotecan	10:00 antineoplastic agents	Yes	No	

(Continued)

Table 1 (Continued). Drugs that have MSHI in the package insert and/or meet the NIOSH definition of a hazardous drug and one or more of the following criteria: are classified by the NTP as "known to be a human carcinogen," or are classified by IARC as (Group 1 "carcinogenic to humans") or (Group 2A "probably carcinogenic to humans.")

Drug	AHFS Classification	MSHI	Biologics License Application	IARC and NTP Classification
trabectedin	10:00 antineoplastic agents	Yes	No	
trifluridine	10:00 antineoplastic agents	Yes	No	
uracil mustard	NA	Yes	No	IARC Group 2B*
valganciclovir	8:18.32 nucleosides and nucleotides	Yes	No	
valrubicin	10:00 antineoplastic agents	Yes	No	
vandetanib	10:00 antineoplastic agents	Yes	No	
vinblastine	10:00 antineoplastic agents	Yes	No	
vincristine	10:00 antineoplastic agents	Yes	No	
vinorelbine	10:00 antineoplastic agents	Yes	No	
vorinostat	10:00 antineoplastic agents	Yes	No	

*Drugs identified as IARC Group 2B "possibly carcinogenic to humans" or as NTP "reasonably anticipated to be a human carcinogen" are listed in Table 1 because they have MSHI.

NIOSH List of Hazardous Drugs in Healthcare Settings 2024, Table 2

The drugs in **Table 2** meet the NIOSH definition of a hazardous drug, and

- Do not have MSHI
- Are not classified by the NTP as "known to be a human carcinogen"
- Are not classified by the IARC as Group 1 "carcinogenic to humans" or Group 2A "probably carcinogenic to humans"

These drugs may exhibit one or more of the types of toxicity described in the NIOSH definition of a hazardous drug.

Some of these drugs may also present an occupational hazard to those workers who are actively trying to conceive, who are pregnant or may become pregnant, and who are breastfeeding because the drugs may be excreted in breast milk.

Drugs reviewed for this update were new drug approvals or received new safety-related warnings from FDA in the period from January 2014 through December 2015.

Drugs underlined and in red font were added on the 2024 *List* update.

Table abbreviations and footnotes. **AHFS** = American Hospital Formulary Service; **NA** = not available.

[†]Previously Table 3. Group 3: Non-antineoplastic drugs that primarily have adverse reproductive effects.

[††]Only an occupational developmental hazard in the third trimester of pregnancy.

Table 2. Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (**Some may also have adverse developmental and/or reproductive effects.**)

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard[†]
abacavir	8:18.08.20 HIV nucleoside and nucleotide reverse transcriptase inhibitors	No	No
abiraterone	10:00 antineoplastic agents	No	**Yes**
acitretin	84:92 skin and mucous membrane agents, miscellaneous	No	**Yes**
afatinib	10:00 antineoplastic agents	No	No
alefacept	84:92 skin and mucous membrane agents, miscellaneous; 92:44 immunosuppressive agents	Yes	No
alitretinoin	84:92 skin and mucous membrane agents, miscellaneous	No	**Yes**
ambrisentan	48:48 vasodilating agents; 24:12.92 vasodilating agents, miscellaneous	No	**Yes**
anastrozole	68:16.08 antiestrogens; 10:00 antineoplastic agents	No	**Yes**
apomorphine	28:36.20.08 nonergot-derivative dopamine receptor agonists	No	No
axitinib	10:00 antineoplastic agents	No	No
bexarotene	10:00 antineoplastic agents; 84:92 skin and mucous membrane agents, miscellaneous	No	**Yes**
bicalutamide	10:00 antineoplastic agents	No	No
blinatumomab	10:00 antineoplastic agents	Yes	No

(Continued)

Table 2 (Continued). **Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (Some may also have adverse developmental and/or reproductive effects.)**

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard†
bosentan	48:48 vasodilating agents; 24:12.92 vasodilating agents, miscellaneous	No	**Yes**
bosutinib	10:00 antineoplastic agents	No	**Yes**
cabergoline	28:36.20.04 ergot-derivative dopamine receptor agonists	No	**Yes**
cabozantinib	10:00 antineoplastic agents	No	**Yes**
carbamazepine	28:12.92 anticonvulsants, miscellaneous; 28:28 antimanic agents	No	No
carfilzomib	10:00 antineoplastic agents	No	**Yes**
ceritinib	10:00 antineoplastic agents	No	**Yes**
cetrorelix	68:18.04 antigonadotropins	No	**Yes**
choriogonadotropin	68:18.08 gonadotropins	Yes	**Yes**
clobazam	28:12.08 benzodiazepines; 28:24.08 benzodiazepines	No	**Yes**
clomiphene	68:16.12 estrogen agonist-antagonists	No	**Yes**
clonazepam	28:12.08 benzodiazepines; 28:24.08 benzodiazepines	No	**Yes**
cobimetinib	10:00 antineoplastic agents	No	**Yes**
colchicine	92:16 antigout agents	No	**Yes**
crizotinib	10:00 antineoplastic agents	No	No
dabrafenib	10:00 antineoplastic agents	No	No
deferiprone	64:00 heavy metal antagonists	No	No
degarelix	68:18.04 antigonadotropins; 10:00 antineoplastic agents	No	**Yes**
dihydroergotamine	12:16.04.04 non-selective alpha-adrenergic blocking agents; 28:32.92 antimigraine agents, miscellaneous	No	**Yes**
dinoprostone	76:00 oxytocics	No	**Yes**

(Continued)

Table 2 (Continued). **Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (Some may also have adverse developmental and/or reproductive effects.)**

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard†
divalproex	28:12.92 anticonvulsants, miscellaneous; 28:28 antimanic agents; 28:32.92 antimigraine agents, miscellaneous	No	**Yes**
dronedarone	24:04.04.20 Class III antiarrhythmics	No	**Yes**
dutasteride	92:08 5-alpha reductase inhibitors	No	**Yes**
entecavir	8:18.32 nucleosides and nucleotides	No	No
enzalutamide	10:00 antineoplastic agents	No	**Yes**
erlotinib	10:00 antineoplastic agents	No	**Yes**
eslicarbazepine	28:12.92 anticonvulsants, miscellaneous	No	**Yes**
estradiol	68:16.04 estrogens; 92:24 bone resorption inhibitors	No	No
estropipate	68:16.04 estrogens	No	No
exemestane	68.16.08 antiestrogens; 10:00 antineoplastic agents	No	**Yes**
exenatide	68:20.06 incretin mimetics	No	No
finasteride	84:92 skin and mucous membrane agents, miscellaneous; 92:08 5-alpha-reductase inhibitors	No	**Yes**
fingolimod	92:20 immunomodulatory agents	No	No
fluconazole	8:14.08 azoles	No	**Yes**
fluoxymesterone	68:08 androgens	No	No
flutamide	10:00 antineoplastic agents	No	No
fosphenytoin	28:12.12 hydantoins	No	No
fulvestrant	10:00 antineoplastic agents	No	**Yes**
ganirelix	68:18.04 antigonadotropins	No	**Yes**
gonadotropin, chorionic	68:18.08 gonadotropins	Yes	**Yes**

(Continued)

Table 2 (Continued). **Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (Some may also have adverse developmental and/or reproductive effects.)**

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard[†]
goserelin	68:18.08 gonadotropins; 10:00 antineoplastic agents	No	**Yes**
histrelin	68:18.08 gonadotropins; 10:00 antineoplastic agents	No	**Yes**
icatibant	92:32 complement inhibitors	No	**Yes**
isotretinoin	84:92 skin and mucous membrane agents, miscellaneous	No	**Yes**
ivabradine	24:04.92 cardiac drugs, miscellaneous	No	**Yes**
leflunomide	92:36 disease-modifying antirheumatic agents; 92:20 immunomodulatory agents	No	No
lenvatinib	10:00 antineoplastic agents	No	**Yes**
letrozole	68.16.08 antiestrogens: 10:00 antineoplastic agents	No	**Yes**
leuprolide	68:18.08 gonadotropins; 10:00 antineoplastic agents	No	**Yes**
lomitapide	24:06.92 antilipemic agents, miscellaneous	No	**Yes**
macitentan	48:48 vasodilating agents; 24:12.92 vasodilating agents, miscellaneous	No	**Yes**
medroxyprogesterone	68:32 progestins; 68:12 contraceptives	No	**Yes**
megestrol	68:32 progestins; 10:00 antineoplastic agents	No	No
menotropins	NA gonadotropins	Yes	**Yes**
methimazole	68:36.08 antithyroid agents	No	No
methylergonovine	76:00 oxytocics	No	**Yes**[††]
methyltestosterone	68:08 androgens	No	**Yes**
mifepristone	76:00 oxytocics	No	**Yes**

(Continued)

Table 2 (Continued). **Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (Some may also have adverse developmental and/or reproductive effects.)**

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard[†]
miltefosine	8:30.92 miscellaneous antiprotozoals	No	**Yes**
mipomersen	24:06.92 antilipemic agents, miscellaneous; 92:18 antisense oligonucleotides	No	No
misoprostol	56:28.28 prostaglandins	No	**Yes**
mycophenolic acid	92:44 immunosuppressive agents	No	No
nafarelin	68:18.08 gonadotropins	No	**Yes**
nevirapine	8:18.08.16 HIV nonnucleoside reverse transcriptase inhibitors	No	No
nilotinib	10:00 antineoplastic agents	No	**Yes**
olaparib	10:00 antineoplastic agents	No	No
ospemifene	68:16.12 estrogen agonist-antagonists	No	No
oxcarbazepine	28:12.92 anticonvulsants, miscellaneous	No	No
oxytocin	76:00 oxytocics	No	**Yes**[††]
palifermin	84:16 cell stimulants and proliferants	Yes	No
pamidronate	92:24 bone resorption inhibitors	No	**Yes**
paroxetine	28:16.04.20 selective serotonin uptake inhibitors	No	**Yes**
pasireotide	68:29.04 somatostatin agonists	No	**Yes**
pazopanib	10:00 antineoplastic agents	No	**Yes**
peginesatide	20:16 hematopoietic	No	**Yes**
pentetate calcium trisodium	NA	No	**Yes**
phenoxybenzamine	12:16.04.04 non-selective alpha-adrenergic blocking agents; 24:08.92 hypotensive agents, miscellaneous	No	No

(Continued)

Table 2 (Continued). **Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (Some may also have adverse developmental and/or reproductive effects.)**

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard†
phenytoin	28:12.12 hydantoins; 24:04.04.08 Class Ib antiarrhythmics	No	No
pipobroman	NA	No	No
plerixafor	20:16 hematopoietic agents	No	**Yes**
ponatinib	10:00 antineoplastic agents	No	No
progesterone	68:32 progestins	No	No
progestins	68:12 contraceptives; 68:32 progestins	No	No
propylthiouracil	68:36.08 antithyroid agents	No	No
raloxifene	68:16.12 estrogen agonists-antagonists; 10:00 antineoplastic agents; 92:24 bone resorption inhibitors	No	No
rasagiline	28:36 antiparkinsonian agents; 28:16.04.12 monoamine oxidase inhibitors	No	No
regorafenib	10:00 antineoplastic agents	No	**Yes**
ribavirin	8:18.32 nucleosides and nucleotides	No	**Yes**
riociguat	48:48 vasodilating agents; 24:12.92 vasodilating agents, miscellaneous	No	**Yes**
sirolimus	92:44 immunosuppressive agents	No	No
sonidegib	10:00 antineoplastic agents	No	**Yes**
sorafenib	10:00 antineoplastic agents	No	**Yes**

(Continued)

Table 2 (Continued). **Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (Some may also have adverse developmental and/or reproductive effects.)**

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard[†]
spironolactone	24:32.20 mineralocorticoid (aldosterone) receptor antagonists; 24:08.24.16 potassium-sparing diuretics; 24:08.44.20 mineralocorticoid (aldosterone) receptor antagonists; 40:28.16 potassium-sparing diuretics	No	No
sunitinib	10:00 antineoplastic agents	No	No
tacrolimus	84:92 skin and mucous membrane agents, miscellaneous; 92:44 immunosuppressive agents	No	No
temazepam	28:24.08 benzodiazepines	No	**Yes**
teriflunomide	92:20 immunomodulatory agents	No	No
testosterone	68:08 androgens	No	**Yes**
tofacitinib	92:36 disease-modifying antirheumatic drugs; 92:20 immunomodulatory agents	No	No
topiramate	28:12.92 anticonvulsants, miscellaneous; 28:32.92 antimigraine agents, miscellaneous	No	**Yes**
toremifene	68.16.12 estrogen agonist-antagonists; 10:00 antineoplastic agents	No	**Yes**
trametinib	10:00 antineoplastic agents	No	No
tretinoin	84:16 cell stimulants and proliferants	No	**Yes**
triptorelin	68:18.08 gonadotropins; 10:00 antineoplastic agents	No	**Yes**
ulipristal	68:12 contraceptives	No	**Yes**
urofollitropin	NA gonadotropins	Yes	**Yes**

(Continued)

Table 2 (Continued). **Drugs that meet the NIOSH definition of a hazardous drug and do not have MSHI, are not classified by NTP as "known to be a human carcinogen," and are not classified by IARC as Group 1, "carcinogenic to humans," or Group 2A, "probably carcinogenic to humans." (Some may also have adverse developmental and/or reproductive effects.)**

Drug	AHFS Classification	Biologics License Application	Only Developmental and/or Reproductive Hazard[†]
valproate/valproic acid	28:12.92 anticonvulsants, miscellaneous; 28:28 antimanic agents; 28:32.92 antimigraine agents, miscellaneous	No	**Yes**
vemurafenib	10:00 antineoplastic agents	No	**Yes**
vigabatrin	28:12.92 anticonvulsants, miscellaneous	No	**Yes**
vismodegib	10:00 antineoplastic agents	No	**Yes**
voriconazole	8:14.08 azoles	No	**Yes**
warfarin	20:12.04.08 coumarin derivatives	No	**Yes**
zidovudine	8:18.08.20 HIV nucleoside and nucleotide reverse transcriptase inhibitors	No	No
ziprasidone	28:16.08.04 atypical antipsychotics; 28:28 antimanic agents	No	**Yes**
ziv-aflibercept	10:00 antineoplastic agents	Yes	**Yes**
zoledronic acid	92:24 bone resorption inhibitors	No	**Yes**
zonisamide	28:12.92 anticonvulsants, miscellaneous	No	**Yes**

[†]Previously Table 3. Group 3: Non-antineoplastic drugs that primarily have adverse reproductive effects.
[††]Only an occupational developmental hazard in the third trimester of pregnancy.

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Changes to the Placement of Drugs From the 2016 *List*

This table identifies drugs that were either removed from the *List* after the 2016 update or were moved to a table that is different from the table on which they were placed in the 2016 *List* update.

Drugs Removed From the 2016 *List*

Drug	Notation
Bacillus Calmette Guerin (BCG)	NIOSH removed BCG from the *List* because it is an infectious agent and not classified as a drug by FDA. For handling recommendations, see drug package insert.
ergonovine	Ergonovine was never approved for use in humans by the FDA in the United States.
liraglutide	NIOSH reviewed data from studies provided by the manufacturer and determined it is unlikely that liraglutide poses a carcinogenic, reproductive, or developmental hazard to workers in a healthcare setting and is no longer considered a hazardous drug by NIOSH.
paliperidone	NIOSH reviewed data from studies provided by the manufacturer and determined it is unlikely that paliperidone poses a carcinogenic, reproductive, or developmental hazard to workers in a healthcare setting and is no longer considered a hazardous drug by NIOSH.
pertuzumab	NIOSH reviewed data from studies provided by the manufacturer and determined it is unlikely that pertuzumab poses a carcinogenic, reproductive, or developmental hazard to workers in a healthcare setting and is no longer considered a hazardous drug by NIOSH.
risperidone	NIOSH reviewed data from studies provided by the manufacturer and determined it is unlikely that risperidone poses a carcinogenic, reproductive, or developmental hazard to workers in a healthcare setting and is no longer considered a hazardous drug by NIOSH.
telavancin	NIOSH removed telavancin from the *List* based on data from reproductive studies provided by the manufacturer concerning its lack of reproductive toxicity.

Drugs Moved to a Different Table

Drug	Notation
abiraterone	Moved from Table 1 to Table 2
acitretin	Moved from Table 3 to Table 2
afatinib	Moved from Table 1 to Table 2
alitretinoin	Moved from Table 3 to Table 2
ambrisentan	Moved from Table 3 to Table 2
anastrozole	Moved from Table 1 to Table 2
axitinib	Moved from Table 1 to Table 2
azathioprine	Moved from Table 2 to Table 1
bexarotene	Moved from Table 1 to Table 2
bicalutamide	Moved from Table 1 to Table 2
bosentan	Moved from Table 3 to Table 2
bosutinib	Moved from Table 1 to Table 2
cabergoline	Moved from Table 3 to Table 2
cabozantinib	Moved from Table 1 to Table 2
carfilzomib	Moved from Table 1 to Table 2
cetrorelix	Moved from Table 3 to Table 2
chloramphenicol	Moved from Table 2 to Table 1
choriogonadotropin	Moved from Table 3 to Table 2
cidofovir	Moved from Table 2 to Table 1
clomiphene	Moved from Table 3 to Table 2
clonazepam	Moved from Table 3 to Table 2
colchicine	Moved from Table 3 to Table 2
crizotinib	Moved from Table 1 to Table 2
cyclosporine	Moved from Table 2 to Table 1
dabrafenib	Moved from Table 1 to Table 2
degarelix	Moved from Table 1 to Table 2

(Continued)

Drugs Moved to a Different Table (Continued).

Drug	Notation
dexrazoxane	Moved from Table 2 to Table 1
diethylstilbestrol	Moved from Table 2 to Table 1
dinoprostone	Moved from Table 3 to Table 2
dronedarone	Moved from Table 3 to Table 2
dutasteride	Moved from Table 3 to Table 2
enzalutamide	Moved from Table 1 to Table 2
erlotinib	Moved from Table 1 to Table 2
eslicarbazepine	Moved from Table 3 to Table 2
estrogen-progesterone combinations	Moved from Table 2 to Table 1
estrogens, conjugated	Moved from Table 2 to Table 1
estrogens, esterified	Moved from Table 2 to Table 1
exemestane	Moved from Table 1 to Table 2
finasteride	Moved from Table 3 to Table 2
fluconazole	Moved from Table 3 to Table 2
flutamide	Moved from Table 1 to Table 2
fulvestrant	Moved from Table 1 to Table 2
ganciclovir	Moved from Table 2 to Table 1
gonadotropin, chorionic	Moved from Table 3 to Table 2
ganirelix	Moved from Table 3 to Table 2
goserelin	Moved from Table 1 to Table 2
histrelin	Moved from Table 1 to Table 2
icatibant	Moved from Table 3 to Table 2
lenalidomide	Moved from Table 2 to Table 1
letrozole	Moved from Table 1 to Table 2
leuprolide	Moved from Table 1 to Table 2
lomitapide	Moved from Table 3 to Table 2

(Continued)

Drugs Moved to a Different Table (Continued).

Drug	Notation
macitentan	Moved from Table 3 to Table 2
megestrol	Moved from Table 1 to Table 2
menotropins	Moved from Table 3 to Table 2
methylergonovine	Moved from Table 3 to Table 2
methyltestosterone	Moved from Table 3 to Table 2
mifepristone	Moved from Table 3 to Table 2
misoprostol	Moved from Table 3 to Table 2
mycophenolate mofetil	Moved from Table 2 to Table 1
nafarelin	Moved from Table 3 to Table 2
nilotinib	Moved from Table 1 to Table 2
oxytocin	Moved from Table 3 to Table 2
pamidronate	Moved from Table 3 to Table 2
paroxetine	Moved from Table 3 to Table 2
pasireotide	Moved from Table 3 to Table 2
pazopanib	Moved from Table 1 to Table 2
peginesatide	Moved from Table 3 to Table 2
pentetate calcium trisodium	Moved from Table 3 to Table 2
pipobroman	Moved from Table 1 to Table 2
plerixafor	Moved from Table 3 to Table 2
ponatinib	Moved from Table 1 to Table 2
regorafenib	Moved from Table 1 to Table 2
ribavirin	Moved from Table 3 to Table 2
riociguat	Moved from Table 3 to Table 2
sorafenib	Moved from Table 1 to Table 2
sunitinib	Moved from Table 1 to Table 2
temazepam	Moved from Table 3 to Table 2

(Continued)

Drugs Moved to a Different Table (Continued).

Drug	Notation
testosterone	Moved from Table 3 to Table 2
thalidomide	Moved from Table 2 to Table 1
topiramate	Moved from Table 3 to Table 2
toremifene	Moved from Table 1 to Table 2
trametinib	Moved from Table 1 to Table 2
tretinoin	Moved from Table 3 to Table 2
triptorelin	Moved from Table 1 to Table 2
ulipristal	Moved from Table 3 to Table 2
uracil mustard	Moved from Table 2 to Table 1
valganciclovir	Moved from Table 2 to Table 1
valproate/ valproic acid	Moved from Table 3 to Table 2
vemurafenib	Moved from Table 1 to Table 2
vigabatrin	Moved from Table 3 to Table 2
vismodegib	Moved from Table 1 to Table 2
voriconazole	Moved from Table 3 to Table 2
warfarin	Moved from Table 3 to Table 2
ziprasidone	Moved from Table 3 to Table 2
ziv-aflibercept	Moved from Table 1 to Table 2
zoledronic acid	Moved from Table 3 to Table 2
zonisamide	Moved from Table 3 to Table 2

As noted earlier, in previous iterations of this *List*, Table 5 provided information on recommended exposure controls for hazardous drugs based on formulations. Information about managing risk of exposure can now be found in *Managing Hazardous Drug Exposures: Information for Healthcare Settings* available through the NIOSH Hazardous Drug Exposures in Healthcare website.

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